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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/823,059	04/13/2004	Alexis P. Bernard	TI-37332	3988

23494 7590 09/24/2007	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED	NG, EUNICE	
P O BOX 655474, M/S 3999		
DALLAS, TX 75265	ART UNIT	PAPER NUMBER
	2626	

NOTIFICATION DATE	DELIVERY MODE
09/24/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
Office Action Summary	10/823,059	BERNARD ET AL.
	Examiner	Art Unit	
	Eunice Ng	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**.　　2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6* is/are pending in the application.

　　4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

　　Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

　　Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

　　a)☐ All　b)☐ Some * c)☐ None of:

　　　1.☐ Certified copies of the priority documents have been received.

　　　2.☐ Certified copies of the priority documents have been received in Application No. _____.

　　　3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

　　* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
　　Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
　　Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1.   The listing of references in the specification is not a proper information disclosure

statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information

submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be

incorporated into the specification but must be submitted in a separate paper." Appropriate

correction is required.

Specification

2.   The abstract and disclosure are objected to because of the following informalities: In

line 6 of the Abstract and p. 2, line 6 of paragraph 7 in the Specification, "transformation

matrix computation T_t" should be --transformation matrix T_t--. Appropriate correction is

required.

Claim Objections

3.   <u>Claims 1-3</u> are objected to because of the following informalities:

In line 1 of claim 2, "claim1" should be --claim 1--.

In line 5 of claim 1, and line 3 of claim 3, " $\eta_{t,f}$ " should be --$\eta_{t,f}$;--.

In line 4 of claim 1, "speech frame t estimating" should be --speech frame t,

estimating-- or --speech frame time t, estimating--.

In line 3 of claim 3, "period t estimating" should be --period t, estimating-- or --time

period t, estimating--.

In line 8 of claim 1, and line 6 of claim 3, the claims should define the variables in MG_tM^{-1}. In line 6 of claim 1, and line 4 of claim 3, the claims should define $\gamma_{t,f}$.

Lines 7-8 of claim 1, and line 5-6 of claim 3, recite "transformation matrix computation MG_tM^{-1}," but line 9 of claim 1, and line 7 of claim 3, recite "transformation matrix computation T_t," referring a different variable. The examiner has interpreted "transformation matrix computation T_t" to be --transformation matrix T_t." Appropriate correction is required.

Claim Rejections - 35 USC § 112

4.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5.   <u>Claim 1</u> recites the limitation "the Viterbi decoding" in the line 10 of the claim. There is insufficient antecedent basis for this limitation in the claim. The examiner has interpreted "the Viterbi decoding" to be --Viterbi decoding--.

<u>Claims 4 and 5</u> recite the limitation "said estimating step" in the first line of each claim. There is insufficient antecedent basis for this limitation in the claims. Claim 3, from which the claims depend, only recite a step of "estimating the SNR" and no other "estimating step" which would provide clear support or antecedent basis for the limitations recited in claims 4 and 5. Appropriate correction is required.

Claim Rejections - 35 USC § 103

6.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7.   Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Agarwal _et al._ (hereinafter "Agarwal"), "Two-Stage Mel-Warped Wiener Filter for Robust

Speech Recognition" (published 1999) in view of Bernard _et al._ (hereinafter "Bernard"),

"Low-Bitrate Distributed Speech Recognition for Packet-Based and Wireless

Communication" (published 2000).

Agarwal teaches a method for performing time and frequency SNR dependent

weighting in speech recognition comprising the steps of:

for each speech frame or period t, estimating the SNR to get time and frequency SNR

information $\eta_{t,f}$ and calculating the time and frequency weighting to get $\gamma_{t,f}$ (Section 2.1,

Formulation of Mel-Warped Wiener Filter; Section 2.2, "Mel-warped Wiener filter requires

an estimate of the noise power spectrum…a precise estimate of noise is essential to insure the

algorithm performance"; Fig. 2, frequency domain Wiener filter, a Weiner filter filters out

noise that has corrupted a signal);

performing the back and forth weighted time varying DCT transformation matrix

computation $MG_t M^{-1}$ to get T_t (section 2.3 and Fig. 2, teaches, "frequencies of the mel-

warped discrete cosine transform…transfer function of the Wiener filter in the frequency

domain is then constructed…noise spectrum is estimated…subtracted from the power

spectrum of the noisy signal…inverse Mel-DCT is computed to obtain the filter in the time

domain"); and

providing the [transformation matrix T$_t$] and the original MFCC feature o$_t$ that

contains the information about the SNR to a recognizer (bottom of Section 2.3, "the power

spectral density is then used to directly calculate the cepstrum for further processing in speech

recognition systems"; section 3, experimental results, "mel-frequency cepstral coefficients").

Agarwal does not explicitly teach, a recognizer including [Viterbi decoding] and

performing weighted Viterbi recognition b$_j$(o$_t$). However, weighted Viterbi

recognition/Viterbi decoding is old and well known in the art as evidenced by Bernard in

Section V. Weighted Viterbi Recognition (WVR), pp. 575-576. It would have been obvious

for one of ordinary skill in the art at the time the invention was made to perform weighted

Viterbi recognition because it preserves synchronization of the Viterbi algorithm and

significantly reduces word error rate, as indicated by Bernard on p. 577, lines 7-9 of Section

C.

8.   Claims 2 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Agarwal *et al.* in view of Bernard *et al.*, and further in view of Pastor *et al.*, US Patent

6,445,801.

Agarwal teaches Wiener filtering (pp. 1-2), which suggests wherein

$$\gamma_{t,f} = \frac{\sqrt{\eta_{t,f}}}{1 + \sqrt{\eta_{t,f}}}$$

, which guarantees that $\gamma_{t,f}$ is equal to 0 when $\eta_{t,f}=0$ and $\gamma_{t,f}$ approaches 1

when $\eta_{t,f}$ is large, the equation $\gamma_{t,f}$ being a Wiener-type filter. It would have been obvious for

one of ordinary skill in the art at the time the invention was made to use a Wiener-type filter

because Wiener filtering enables the separation of the signals by decorrelation. Its importance

is related to the simplicity of the theoretical computations. Furthermore, it can be applied to a multitude of particular processes such as the removal of a noise that is polluting a speech signal, as indicated by Pastor *et al.*, in col. 1, line 66 – col. 2, line 5. The equation $\gamma_{t,f}$ is just an alternative method of performing weighting for emphasizing the signal or the noise.

Conclusion

9.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

US Patent 4,811,404 (Vilmur et al.) teaches a noise suppression system.

US Patent Pub. 2004/0213419 (Varma et al.) teaches noise reduction systems and methods for voice applications.

US Patent 7,058,572 (Nemer) teaches reducing acoustic noise in wireless and landline based telephony.

US Patent 6,263,307 (Arslan et al.) teaches adaptive Wiener filtering using line spectral frequencies

US Patent Pub. 2004/0064307 (Scalart et al.) teaches a noise reduction method and device.

US Patent Pub. 2002/0035471 (Breton) teaches a method and device for voice recognition in environments with fluctuating noise levels.

Bernard et al. teaches "Joint Channel Decoding – Viterbi Recognition for Wireless Applications."

Yoma et al. teaches "Weighted Viterbi Algorithm and State Duration Modelling for Speech Recognition in Noise."

10.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eunice Ng whose telephone number is 571-272-2854. The examiner can normally be reached on Monday through Friday, 8:30 a.m. - 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Hudspeth can be reached on 571-272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

EN
9/10/07

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